largely original and advisedly subordinated to the text. The Rural Science Series contains many valuable treatises, and although comparisons *are* invidious, none shows greater evidence of most careful writing in the face of an obvious necessity for compression. Beekeepers, both amateur and commercial, and teachers in agricultural colleges, are under a debt of gratitude to the author of this book; if it does not come to be regarded as the standard handbook on the subject on this continent we shall be greatly surprised.

C. Gordon Hewitt

## A VALUABLE UNPUBLISHED WORK ON POMOLOGY

Most horticulturists are doubtless familiar with "A View of the Cultivation of Fruit Trees of America," published in 1817 by William Coxe, of Burlington, N. J., who has been called "The Father of American Pomology," but probably few are aware of the existence of an unpublished book of colored drawings of the fruits that were illustrated in this work by wood cuts. On pages 225–226 of the *Country Gentleman,* of Albany, N. Y., for April 2, 1857, there was published by E[dmund] L[aw] R[ogers], Baltimore, Md., an account of the activities of Mr. Coxe, in which it is stated that he had intended publishing a second edition of the work, accompanied by colored engravings for which natural-size water-color drawings had been prepared by his daughters. The publication of this second edition was prevented by Mr. Coxe's death in 1831. About twenty years ago this article came to the attention of Mr. William A. Taylor, then assistant pomologist of the U. S. Department of Agriculture, and a number of letters were written in an effort to locate the colored drawings, but without success. The matter was then dropped until the spring of 1915 when, in a conversation regarding some old horticultural catalogs, Mr. Taylor related these facts to the writer who suggested that it might still be possible to locate the unpublished colored plates through methods used by genealogical research workers.

The search was begun by looking up at the Library of Congress historical and genealogical works which might give information regarding the descendants of William Coxe, with the result that a list of his children was obtained, with some of their marriages. From this it was learned that Philadelphia and vicinity was at present the most likely locality to search for his descendants. Addresses were obtained of several of the Coxe family in that vicinity and a form letter sent to all of them giving the object of the inquiry, with the result that a chart of this branch of the family, only recently published, was secured by the writer. This gave the names of all descendants to date, but without addresses, although the places of births were usually given. With this clue several city and telephone directories were consulted and addresses of most of the descendants obtained. About twenty-five copies of the form letter were then sent to these addresses with the almost immediate result of six replies giving the address of the probable possessor of the work, followed the next day by a letter from one of the twenty-five addressed acknowledging the possession of the work.

It is with great pleasure that announcement is made of the donation of the unpublished colored drawings of fruits to the Library of the U. S. Department of Agriculture by the grandchildren of Mrs. Elizabeth (Coxe) McMurtrie, a daughter of William Coxe, by whom most of the paintings were made. The drawings are bound and in an excellent state of preservation. The character of the work shows a high degree of skill on the part of the artist in depicting fruits; and the positive identification of all the earlier descriptions and illustrations, some of which have long been in doubt, will now be possible. The work has been placed in a fireproof building and it is expected that the additional safeguard of a fireproof safe for this and similar books will be provided at an early date.

The drawings are accompanied by the bound manuscript upon which the published work was based, to which have been added numerous notes intended for a second edition. Many of

the notes bear dates ranging from 1810 to 1828 and it probable that the water-color work was largely done in the early part of this period, for several varieties are illustrated which according to the manuscript did not live long, or were destroyed as being of little value or particularly subject to disease.

In this connection it may be of interest to pathologists to call attention to early records which the manuscript and drawings contain relating to plant diseases, some of which were not described or apparently were but little known at that time to botanists or mycologists, and one of which at least was not recognized until fifty years later. There were few mycologists in this country or Europe at that early period and many diseases were not of sufficient economic importance to attract their attention. In fact most of the growers, if they paid any attention to fruit spots at all, considered them a part of the fruit. Many of the diseases now well known were doubtless of common occurrence even then, and perhaps much earlier. Microscopes of any decided magnification were then unknown, and scientists of those days can hardly be blamed for failing to make such observations.

In Coxe's published work of 1817 but one disease is mentioned, the fire blight of the pear (*Bacillus amylovorus* (Burr.) De Toni) which evidently then as now was a serious disease towards the eradication of which but little progress apparently has been made in the 100 years which have followed. In the season of 1915 which was unusually wet, this disease swept over a large part of the apple-producing section of the country, doing great damage to the trees. Stevens and Hall state[1] that this has been known over 100 years. It is probable that much earlier records could be found by the examination of older literature. The organism that causes the blight was not described until 1888.

In the unpublished colored drawings and the manuscript accompanying them are found descriptions or very accurate colored illustrations of the following fungous diseases:

[1] Stevens, F. L., and Hall, J. G., "Diseases of Economic Plants," 101, 1910.

*Leaf Blight* (*Fabræa maculata* (*Lev.*) *Atk.*).—The species was first issued in exsiccati by Léveillé in 1843 as *Entomosporium maculatum* and described somewhat later. The characteristic fruit spots are well depicted on both the pear and apple.

*Pear Scab* (*Venturia pyrina Aderh.*).—This was for many years confused with the apple scab and was not separately described until 1896.

*Apple Scab* (*Venturia inæqualis* (*Cooke*) *Winter*).—This was first described under *Sphærella* by Cooke in 1871.

*Flyspeck of Apple* (*Leptothyrium pomi* (*Mont. & Fr.*) *Sacc.*).—This was first described under *Labrella* in 1834. The sooty blotch (*Phyllachora pomigena* (Schw.) Sacc.) according to Duggar is only one stage of the flyspeck, and was first described by Schweinitz under *Dothidea* in 1832. Both are well illustrated on a number of varieties of apples.

*Bitter Rot* (*Glomerella rufomaculans* (*Berk.*) *Spauld. & Von Schrenk*).—This was first described by Berkeley under *Septoria* in 1854. Spaulding and Von Schrenk did not discover an earlier reference to the disease. In the Coxe manuscript under date of May 30, 1829, the bitter rot is referred to as common, with the statement that the author had been told by John Hoskins the elder that slaked lime was a good remedy for the disease. In accordance with this suggestion he spread a peck of slaked lime around each of 21 apple trees and worked it into the soil. No notes were made as to results, owing to his early death.

*Fruit Spot* (*Cylindrosporium pomi Brooks*). This disease is well illustrated on several varieties of apples and has been identified beyond question by Mr. Brooks. The disease was first discovered by Brooks in 1896. He states that it was first reported in Germany by Sorauer in 1879 and in this country by Jones in 1891. It was evidently not previously distinguished from the bitter rot.

*Peach Scab* (*Cladosporium carpophilum Thüm.*).—This was first described by von Thümen in 1879.

Probably other fungi are figured on the vari-

ous fruits but none that can be identified with accuracy.

A reference is also made in the manuscript to worms around the roots of peach trees which are said to cause an exudation of gum. This probably refers to the larvæ of some boring insect. An attempt was made to get rid of them by applying a handful of salt around the roots once or twice a season with the only result, however, that the larvæ were more numerous after the application than before.

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## SPECIAL ARTICLES

### THE INVERSION OF MENTHONE BY SODIUM, POTASSIUM AND LITHIUM ETHYLATES, AND A METHOD OF ANALYSIS FOR METHONE IN PINE OILS

THE work of Tubandt[1] has shown that the reaction

$$l\text{-menthone} \rightleftarrows d\text{-menthone}$$

can be followed polarimetrically, is monomolecular and is catalyzed by acids and bases. The present study has involved the measurement of the velocity of the inversion when brought about by sodium, potassium and lithium ethylates in absolute ethyl alcohol at 25°; a special constant temperature bath, holding silver-plated copper polarimeter tubes, has been employed.

The molar constant, $K_N$, found for the activity of the three ethylates at dilutions ranging from $N/32$ to $N/512$, were substituted in the equation $K_N = K_i\alpha + K_m(1-\alpha)$, derived by one of us[2] to express the activity of both the non-ionized molecules and the ions of a reacting electrolyte, and gave series of satisfactory constants for the activity of both the ethylate ions, $K_i$, and the non-ionized molecules $K_m$, of each ethylate.

It was found that the constant expressing the activity of the ethylate ion was the same, whether calculated from the data for sodium, potassium or lithium ethylate: for $NaOC_2H_5$, $K_i = 0.501$; for $KOC_2H_5$, $K_i = 0.501$, and for $LiOC_2H_5$, $K_i = 0.496$. The constants for the reactivity of the non-ionized ethylate were found to be very nearly the same for sodium and potassium ethylates, but somewhat lower in the case of lithium ethylate, as has been found to occur with other reactions. Thus, for $NaOC_2H_5$, $K_m = 0.693$; for $KOC_2H_5$, $K_m = 0.701$, and for $LiOC_2H_5$, $K_m = 0.478$.

The relative magnitudes of these constants agree with the fact that the molar constant, $K_N$, drops off with dilution for sodium and potassium ethylates, but does not change with dilution in the case of lithium ethylate; that the molar constants for sodium and potassium ethylates are close to one another in value, but different from those for lithium ethylate; and, finally, that the reaction velocity constants become practically the same for all three ethylates in the very dilute solutions in which the metallic ethylate is nearly completely ionized.

Having shown above that sodium, potassium and lithium ethylates cause the inversion of menthone, it was thought important to use this as an analytical method to determine the presence of menthone, and its amount, in certain pine oils said to contain the levo form of this material. Eight per cent. absolute alcoholic solutions of pine oil and of several of its fractions were made. These contained also $N/64$ sodium ethylate. These solutions showed no appreciable change in optical rotation in about three hours. In order to prove that no *l*-menthone was present in the pine oil an alcoholic solution containing 2 per cent. of partly inverted *l*-menthone and 8 per cent. of the same pine oil, or of its fractions, and $N/64$ sodium ethylate, was found to give the usual change in rotation observed for alcoholic solutions of *l*-menthone. It is clear, then, that pine oils have no appreciable influence on the change of rotation of admixed *l*-menthone and that the amount and rapidity of change of rotation by a given concentration of sodium, potassium or lithium ethylate can be used as a measure of the amount of *d*- or *l*-menthone in pine oil in excess of any amount of the equilibrium mixture of *d*- and *l*-menthone. If there is an excess of *l*-menthone present its effect on the rotation may be offset by other constituents hav-

[1] *Ann.*, 339, 41, 1904.

[2] *Am. Chem. Jour.*, 48, 359, 1912.